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(54) **High-transverse-curvature tyre, in particular for motor-vehicle wheels**

Reifen mit Hoch-Querkrümmung, insbesondere für Kraftfahrzeugräder

Bandage pneumatique à haute courbure transverse, en particulier pour roues de véhicule à moteur

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Description

[0001] The present invention relates to a process for the manufacture of a high-transverse-curvature tyre, in particular for motor cycle wheels, and to such a tyre according to the preamble of claim 7.

[0002] While being conceived in particular with reference to the manufacture of tyres for high-performance motorcycles, the innovatory principles suggested by the present invention can be adopted to advantage in the manufacture of any type of high-transverse-curvature tyre in which the belt structure is made separately from the carcass structure and subsequently assembled.

[0003] It is known that during the manufacture of tyres for motor-vehicles, or in any event tyres characterized by a high transverse curvature, the belt structure is made on a so-called "comb drum", to be subsequently picked up, after application of the tread band, by a transfer ring bringing it into engagement with a carcass structure previously made on a building drum.

[0004] In greater detail, according to the traditional tyre manufacturing method, for making the belt structure one or more belt strips are wound in mutual overlapping relation round the comb drum so that, when winding has been completed, said belt strips are substantially shaped as a cylindrical sleeve. At this point, upon intervention of a plurality of radially expansible sectors provided in the comb drum, the belt structure acquires a curvilinear transverse profile substantially coinciding with the transverse profile that the finished tyre will have.

[0005] The thus shaped belt structure is ready to be picked up from the comb drum and be coupled with the carcass structure, after application of the tread band.

[0006] One example of the above described state of the art is given in the Italian Patent Application No. 22730A/89 (EP-A-0 433 974) in the name of the same applicant.

[0007] Recently, referring above all to high-performance tyres for motorcycles, belt structures have become increasingly more used which essentially consist of a single cord or a plurality of cords disposed parallelly in side by side relation to form a ribbon-like structure which is directly wound on the comb drum in a plurality of circumferential parallel side by side coils substantially oriented in the rolling direction of the tyre. Such a tyre is disclosed for example in the Italian Patent Application No. 20646A/90 (EP-A-0 461 646) in the name of the same applicant, and corresponds to the preamble of claim 7.

[0008] In this solution it is necessary that the winding operation be executed with the expansible sectors of the comb drum already extracted from the drum itself. In fact, since the cord used is of the inextensible type, it would be impossible to carry out the radial extraction of the sectors, if the cord had been previously wound on the comb drum in a cylindrical configuration.

[0009] However, the individual coils could encounter problems in terms of stability during winding, due to the fact that the sectors on which said cord is to be wound have a curved profile. It is therefore necessary that before the winding operation, an auxiliary support element of raw elastomeric material be laid down on the comb drum. This auxiliary element, by virtue of its adhesiveness, is capable of ensuring the geometrical and structural stability of the coil layer being progressively formed during the cord winding.

[0010] This auxiliary support element, made in the form of a sheet obtained through usual drawing and/or calendering steps, is wrapped in the form of a cylindrical sleeve round the comb drum having its sectors retracted, to be then expanded and shaped according to the radially external profile of the expansible sectors, following extraction of the latter before the beginning of the cord winding.

[0011] The fundamental properties of this support element are therefore stretchability and adhesiveness so that the element will be bound not only to the cord that is going to be wound, but also, during the tyre manufacture, to the adjacent elements.

[0012] For the purpose, the use of natural rubber possessing both a good adhesiveness and a good stretchability in a raw state is therefore preferred: the bond between said support element and the adjacent elements is further promoted by the fact that also the rubberizing blends for the carcass plies and the belt strips are mainly natural-rubber-based blends.

[0013] On the other hand, this auxiliary support element does not perform any structural function, its only aim being that of stabilizing the coils formed by the cord while the belt structure is being made, so that its presence in the finished tyre is not essential. It would be therefore desirable for the elastomeric sheet forming said support element to have weight and thickness as much as possible reduced in order to minimize the effects of its presence in the finished tyre, in particular for the purpose of restraining the centrifugal forces induced by said support element and reducing the resistance to rolling of the tyre during the running.

[0014] Furthermore, natural rubber and also other known blends, while having sufficient stretchability as a whole, do not bear a thickness reduction under 0.5 mm, due to the insufficient mechanical strength at high localized stretching variations, like those generated during the radial expansion of the curved sectors of the comb drum.

[0015] One could think about increasing this strength by means of appropriate reinforcing fillers; however known methods of imparting good mechanical-strength features to an unvulcanised elastomeric material, based on the use

either of previously cross-linked or crystalline polymers, or textile or mineral fibres, did not give satisfactory results: in fact they had several disadvantages, in particular a strong adhesiveness reduction often without increasing and even decreasing stretchability.

[0016] There are also other reasons preventing the sizes of said auxiliary element from being reduced under the above mentioned value: in fact, with presently used traditional blends and with usual machines, practical problems arise that virtually do not enable sheet thicknesses lower than 0.5 mm to be achieved. The following drawbacks should be noted in particular: the material has a tendency to adhere to the machine components (the calender cylinders, for example) so that it tears on separation; the sheet thickness does not keep constant but it increases on its coming out of the machine and in addition said thickness varies in an uneven manner, transversally of the feed direction of the sheet; and it is very difficult (sometimes even impossible) to collect the sheet and convey it to the subsequent use stations without causing pleats and, as a result, strong localized variations in thickness.

[0017] In one aspect the invention relates to a process comprising the steps of claim 1.

[0018] *EP-A-0 329 589 generally discloses a tyre comprising a rubber reinforcement containing aramid pulp in which the belt cords are completely embedded.*

[0019] *EP-A-0 320 705 discloses a low-transverse-curvature tyre comprising a belt structure with two sheets of elastomeric material filled with homogeneously distributed fibrillose fibers and a cord wound in a plurality of circumferential coils that are either completely embedded in, or completely outside from, such sheets.*

[0020] In accordance with the present invention, it has been found that making the auxiliary support element of an elastomeric material filled with appropriate bonding means, preferably consisting of short fibrillose fibres of poly-para-phenylene terephthalamide (usually defined as aramid pulp) commercially known as Kevlar* Pulp or Twaron** Pulp (*registered trademark of Du Pont; ** registered trademark of Akzo) in an amount included between 1 and 10 phr, a surprising increase in the structural strength of the elastomeric sheet is achieved along with high adhesiveness and constancy in the imposed size values, so that it is possible to achieve greatly lower thicknesses as compared with those of the known art. The sheet thus produced is capable of bearing without damages the stresses it undergoes during the sheet preparation process, that is its winding and unwinding round and from the collecting rolls, its separation from the support means (usually polythene or other service material), its laying onto the comb drum and the subsequent stretching, by expansion of the curved sectors.

[0021] In a further aspect the invention relates to a tyre of high transverse curvature for motor cycle wheels, comprising the features of claim 7.

[0022] Preferentially, said fibrillose short fibres comprise short fibres of poly-para-phenylene terephthalamide, inserted in the elastomeric material forming said sheet in an amount included between 1 and 10 phr and having a length included between 0.1 mm and 2.5 mm.

[0023] Advantageously, said sheet of elastomeric material has a thickness included between 0.075 and 0.5 mm.

[0024] Preferably, said fibrillose short fibres are pre-oriented (by a calendering operation for example) in the major direction of the forces to which the support element is submitted during the tyre manufacture process. Normally this direction is the circumferential direction of the tyre and said pre-orienting operation is preferentially carried out by calendering of said sheet during the manufacture process of same.

[0025] The elastomeric material reinforced with said aramid, in the raw state has a tensile strength included between 3 and 7 MPa and a 50% elongation under a traction load included between 0.2 and 0.5 mPa.

[0026] The material forming said auxiliary support element can be a natural rubber-based blend containing carbon black in an amount included between 30 and 70 phr, filled with usual ingredients known in the art (plasticizers, protection agents, degradation-resistent and vulcanising agents) so as to obtain an elastomeric matrix as much as possible similar to that of the elements to which said sheet must adhere.

[0027] Further features and advantages will become more apparent from the detailed description of a preferred embodiment of a high-transverse-curvature tyre for motor cycles, in accordance with the present invention. This description will be given hereinafter, by way of non-limiting example, with reference to the accompanying drawings, in which:

- Fig. 1 is a cross-sectional profile of a tyre made in accordance with the present invention;
- Figs. 2 to 6 diagrammatically show some steps of the manufacturing process of the tyre of the invention.

[0028] Referring to the drawings, a high-transverse-curvature tyre for motor cycles in accordance with the present invention has been generally identified by reference numeral 1.

[0029] Tyre 1 has a carcass structure 2 comprising at least one carcass ply 3 the opposite side edges 3a of which are turned back around corresponding bead cores 4.

[0030] An elastomeric filler is applied to the external perimetric edge of the bead cores 4 and it occupies the space defined between the carcass ply 3 and the corresponding turned back side edge 3a.

[0031] Associated with the carcass structure 2 is a belt structure 6 essentially consisting of at least one inextensible

cord 7 extending in a crown configuration circumferentially of the carcass ply 3 to form a plurality of parallel coils 7a disposed consecutively in side by side relation and substantially oriented in the rolling direction of the tyre 1.

[0032] The coils 7a disposed consecutively side by side to form a curvilinear profile, by virtue of their longitudinal inextensibility cause a structural and dimensional stabilization of the tyre 1 according to the desired transverse-curvature profile.

[0033] In known manner, a tread band 8 is applied to the belt structure 6, said tread being the ground-contacting area of the tyre.

[0034] As shown in Fig. 1, coils 7a formed of the inextensible cord 7 are wound on an auxiliary support element 9 substantially consisting of an elastomeric sheet interposed between the belt structure 6 and carcass ply 3 and shaped like the transverse-curvature profile of the layer formed by the coils themselves.

[0035] Referring particularly to Figs. 2 to 6 diagrammatically showing some of the main manufacturing steps of the tyre, laying of the auxiliary support element 9 onto an usual comb drum 10 is first carried out, as shown in Fig. 2, so as to make the belt structure and give it a cylindrical conformation.

[0036] Subsequently, as shown in Fig. 3, the extraction of a plurality of radially expansible curved sectors 11 usually associated with the comb drum 10 is caused, the shape of said sectors conforming to the intended cross-sectional profile of the belt structure 6. Under this situation, the auxiliary support element 9 is forced to expand and undergoes a plastic stretching so that it takes the shape of the external profile of the expansible sectors 11. Then winding of the inextensible cord 7 in a plurality of coils 7a disposed consecutively side by side is carried out, starting from one of the end edges of the auxiliary support element 9 for example, as shown in Fig. 3. During this step, the adhesiveness of the raw elastomeric material forming the auxiliary support element ensures a stable positioning of the individual coils 7a formed on the expansible sectors 11, without any risk that the coils will undesirably slip along the external profile of said sectors.

[0037] When winding is over, with the optional aid of presser rollers 12 (Fig. 4), the application of the tread band 8 to the belt structure 6 formed on the expansible sectors 11 of the comb drum 10 is carried out.

[0038] In known manner the belt structure 6, together with the tread band 8 to which said belt is applied, is taken up by a transfer ring 13 provided with appropriate grasping means 14 and is coaxially fitted onto the carcass structure 2 previously formed on a building drum 15 associated with said manufacturing machine. The carcass ply first arranged in the form of a cylindrical sleeve is radially expanded by axially moving the bead cores 4 close to each other upon command of the building drum 15 and optionally admitting air to the inside of said sleeve, in order to obtain fitting of same to the radially inner surface of the belt structure 6, and more particularly, the auxiliary support element 9.

[0039] The manufactured tyre 1 will be then taken up from the building drum 15 to be submitted to the final vulcanization process.

[0040] In the light of the above, it will be recognized that the auxiliary support element 9 quite conveniently retains the coils 7a formed by the cord 7 to give the belt 6 a sufficient structural stability while it is being made and in the subsequent handling steps preceding mounting of same to the carcass structure 2. Further advantages to the operating features of the vulcanised tyre appear to having be obtained with the presence of the auxiliary element 9, even if, at the moment, they are not completely cleared up. Anyway, the auxiliary support element 9 should be made as thin as possible in order to conveniently restrain its bulkiness and weight, taking into account the fact that the weight of said support element is of great importance in connection with the generation of centrifugal forces since it is located in the tyre areas of maximum radius.

[0041] In order to enable the manufacture and use of auxiliary support elements 9 of much lower thickness than thicknesses permitted in the known art, it has been envisaged that the elastomeric material forming the auxiliary element should contain the so-called aramid pulp (fibrillose short fibres of poly-para-phenylene terephthalamide) homogeneously dispersed therein, of the type commercially known as "Kevlar-pulp" or "Twaron-pulp" (Kevlar and Twaron are registered trademarks of Du Pont and Akzo, respectively), adapted to increase the mechanical strength and stretchability features of the elastomeric material in the raw state, without substantially altering the adhesiveness features of same.

[0042] It has been found in fact that in the presence of aramid fibres dispersed in the elastomeric material blend forming said auxiliary support element 9, the latter can be made in the form of a very thin sheet, without undergoing any tearing as a result of the plastic deformations induced therein by effect of the extraction of the expansible sectors 11 from the comb drum, and upon the action of the tangential stresses transmitted during laying of the inextensible cord 7.

[0043] In greater detail, it has been found that the best results are achieved by introducing the aramid pulp into the raw elastomer blend in an amount included between 1 and 10 phr (parts by weight per 100 parts of rubber) and using fibres of a length included between 0.1 and 2.5 mm.

[0044] Practically, by adopting the innovatory solutions proposed by the invention, it is possible to make and use in the tyre manufacture, an auxiliary support element 9 of a thickness included between 0.075 and 0.5 mm, preferably in the range of 0.25 mm or less, so that its weight is less than halved as compared with the weight of the auxiliary elements

made according to the known art.

[0045] The resistance to the stretching actions induced by extraction of the expansible sectors 11 can be further increased if the auxiliary element 9 is made by calendering, so that the aramid fibres are pre-oriented in a preferential direction in the elastomer sheet forming the auxiliary element itself: this preferential direction usually is (at least for use in the described tyre) the circumferential direction of the tyre coinciding with the longitudinal direction of the sheet emerging from the calender.

[0046] By way of example, in the following table the compositions of six different blends are reproduced, namely a traditional blend (A) for the specified use, two blends (B, C) reinforced according to the solutions of the known art and three blends (D, E, F) according to the invention.

[0047] In particular, blend B was reinforced by means of a crystalline polymer named transpolyoctenamer, best known as "Vestenamer 8612" available from HÜLS, whereas blend C was reinforced by means of a previously cross-linked polymer, commercially known as SBR4503 available from AMERIPOL SYNPOL Corp.

[0048] For all cited blends, tensile strength (in MPa) and adhesiveness (evaluated according to a scale from 0 to 10) are shown, these values being measured on the unvulcanised blend.

[0049] It is possible to see that in the blends of the invention, due to the addition of aramid fibres with a distribution of lengths between 0.2 and 0.8 mm in an amount included between 1 and 5 phr, a tensile strength varying between 3 and 5 MPa was obtained, with a 50% elongation under traction loads included between 0.6 and 2.5 MPa respectively, while maintaining the adhesiveness value of the traditional blend substantially unaltered.

[0050] In the same elastomer, devoid of aramid fibres, the tensile strength corresponds to 1.6 MPa, whereas an elongation of 50% is caused by a traction load of 0.3 MPa.

[0051] On the contrary, in blends reinforced in the usual manner the tensile strength values are comparable with those of the blends of the invention, but the adhesiveness value shows completely inacceptable values, that is of the order of 50%.

TABLE

INGREDIENTS/BLENDS	A	B	C	D	E	F
Natural rubber	100	70	70	100	100	100
Carbon black	55	55	55	55	55	55
Vestenamer 8612	=	30	=	=	=	=
SBR 4503	=	=	30	=	=	=
Aramid pulp	=	=	=	1	3.5	5
Zinc oxide	5	5	5	5	5	5
Protective system	2	2	2	2	2	2
Vulcanizing system	5	5	5	5	5	5
PROPERTIES/BLENDS	A	B	C	D	E	F
50% Elongation modulus	0.3	1.5	1	0.6	1.5	2.5
Tensile strength	1.6	5.5	4.8	3	4.5	5
Adhesivity	9	4	5	9	8	8

[0052] Obviously the stated values can be varied within some limits depending on the type of elastomer and blend used, and also depending on the amount and typology of the aramid fibres used.

[0053] For the purposes of the present invention, it is however preferable that the tensile strength be included between 3 and 7 mPa and that a 50% elongation should be caused by a load included between 0.6 and 3 MPa.

[0054] The present invention is believed to produce its beneficial effects with inextensible metallic cords such as those of the regular lay type usually adopted for the construction of the belt structure in the tyres for motor cycle wheels. The present invention showed to produce results of specific relevance when adopted in tyres for two-wheeled vehicles. More specifically, the present invention showed very good results (as shown by a series of road tests made by the Applicant) when adopted in combination with the very well known High Elongation type metallic cords described in more details in the above cited Italian patent application. No.20646A/90, to which one may refer for further exhaustive information, both in respect of the cord itself and of the tyre structure.

[0055] Said cords have a typical behavior under load, characterized by a load-elongation diagram having a curvilinear portion (whose center line usually ranges between an elongation value of 1.5% to 3%) which mutually connects two substantially rectilinear lengths of different slope relative to the axes of said diagram, such that the cord is initially more elongated at low loads.

[0056] The above cited results denote that the auxiliary element 9 according to the invention has also a great influence on the operating characteristics of the tyre in exercise, particularly as far as regards the entity of the slip thrust supported

by the tyre under drift, with consequent not negligible increase of its performance level, mainly in terms of speed and stability at high speed.

[0057] Once the skilled in the art understands the invention, as described hereabove, he will be able to make those selections, variations and modifications to the variables which are associated with the invention as claimed to meet his specific technical needs.

Claims

1. A process for the manufacture of a high-transverse-curvature tyre, in particular for motorcycle wheels, comprising the steps of:

   - previously manufacturing on a building drum a carcass structure (2) comprising at least one carcass ply (3) having its edges (3a) turned back around two bead cores (4);
   - arranging an auxiliary support element (9) on a comb drum (10), in a cylindrical configuration, said support element being made in the form of a sheet of raw elastomeric material including fibrillose fibres homogeneously distributed in the elastomeric material in order to increase the stretchability features of said material without substantially altering the adhesiveness features of same wound round the comb drum itself;
   - shaping the comb drum (10) through radial expansion of a plurality of radially movable sectors (11) associated with the comb drum (10), so as to give to the auxiliary support element (9) a curvilinear transverse profile;
   - circumferentially winding round the auxiliary support element (9), at least one inextensible or high elongation type metallic cord (7) forming a plurality of circumferential coils (7a) disposed consecutively side by side to define a belt structure (6) of a curvilinear transverse profile;
   - circumferentially applying a tread band (8) to the belt structure (6);
   - applying the belt structure (6) together with the tread band (8) to the circumference of the previously manufactured carcass structure (2).

2. A process according to claim 1, characterized in that said fibrillose fibers comprise aramid pulp.

3. A process according to claim 1, characterized in that said aramid pulp is introduced into the elastomeric material in an amount included between 1 and 10 phr.

4. A process according to claim 3, characterized in that the fibres in said aramid pulp have a length included between 0.1 and 2.5 mm.

5. A process according to claim 1, characterized in that the auxiliary support element (9) is formed through a calendering step, for pre-orienting said aramid fibres in a preferential direction in the elastomeric material.

6. A tyre for motorcycle wheels obtained through a process as claimed in claims 1 to 5.

7. A tyre having a high-transverse curvature for motorcycle wheels comprising:

   - a carcass structure (2) consisting of at least one carcass ply (3) having its circumferential end edges (3a) turned back around two bead cores (4);
   - a belt structure (6) extending circumferentially about the carcass ply (3) of at least one inextensible or high elongation type metallic cord (7) wound in a plurality of circumferential coils (7a) disposed side by side according to such high-transverse-curvature profile;
   - a tread band (8) applied circumferentially to the belt structure (6);

   characterized in that said tyre further

   contains an auxiliary support element made in the form of a single sheet (9) of elastomeric material comprising bonding means homogeneously distributed in the elastomeric material;
   all the coils of said at least one cord (7) are radially externally wound on said sheet (9); and
   said bonding means comprises fibrillose fibres for increasing the stretchability features of said material without substantially altering the adhesiveness features of same during the tyre manufacturing steps, when said material is in the raw state.

8. A tyre according to claim 7, characterized in that said fibrillose fibers comprises aramid pulp.

9. A tyre according to claim 8, characterized in that said aramid pulp is introduced into the elastomeric material forming said sheet in an amount included between 1 and 10 phr.

10. A tyre according to claim 8, characterized in that said aramid pulp comprises fibrillose short fibres of poly-para-phenylene terephthalamide having a length included between 0.1 and 2.5 mm.

11. A tyre according to claim 8, characterized in that said aramid fibres are pre-oriented in the circumferential direction of the tyre.

Patentansprüche

1. Verfahren zur Herstellung von Reifen mit einer hohen Querkrümmung, insbesondere für Motorradräder, welches die Schritte aufweist,

   - vorausgehend auf einer Bautrommel einen Karkassenaufbau (2) mit wenigstens einer Karkassenlage (3) herzustellen, deren Ränder (3a) um zwei Wulstkerne (4) umgeschlagen sind,
   - ein behelfsweises Stützelement (9) auf einer Kammtrommel (10) in einer zylindrischen Form anzuordnen, wobei das Stützelement, das in Form einer Bahn aus Rohelastomermaterial mit dünnfädigen Fasern hergestellt ist, die homogen in dem Elastomermaterial verteilt sind, um die Streckbarkeitseigenschaften des Materials zu erhöhen, ohne seine Haftfähigkeitseigenschaften wesentlich zu ändern, um die Kammtrommel herum gelegt ist,
   - die Kammtrommel (10) durch radiale Expansion einer Vielzahl von radial beweglichen Sektoren (11), die der Kammtrommel (10) zugeordnet sind, in eine solche Form zu bringen, daß dem behelfsweisen Stützelement (9) ein gekrümmtes Querprofil gegeben wird,
   - um das behelfsweise Stützelement (9) um den Umfang wenigstens einen nicht dehnbaren metallischen Kord (7) oder einen metallischen Kord (7) mit hoher Dehnung herumzuwickeln, der eine Vielzahl von Umfangswindungen (7a) bildet, die aufeinanderfolgend Seite an Seite zur Bildung eines Gurtaufbaus (6) mit einem gekrümmten Querprofil angeordnet sind,
   - am Umfang ein Laufflächenband (8) auf den Gurtaufbau (6) aufzubringen und
   - den Gurtaufbau (6) zusammen mit dem Laufflächenband (8) auf den Umfang des vorausgehend hergestellten Karkassenaufbaus (2) aufzubringen.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß die dünnfädigen Fasern eine Aramidfasermasse aufweisen.

3. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß die Aramidfasermasse in das Elastomermaterial in einer Menge eingebracht wird, die zwischen 1 und 10 phr liegt.

4. Verfahren nach Anspruch 3, dadurch gekennzeichnet, daß die Fasern in der Aramidfasermasse eine Länge zwischen 0,1 und 2,5 mm haben.

5. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß das behelfsweise Stützelement (9) mittels eines Kalandrierschritts zur Vorausrichtung der Aramidfasern in eine Vorzugsrichtung in dem Elastomermaterial hergestellt wird.

6. Reifen für Motorradräder erhalten nach einem Verfahren, wie es in den Ansprüchen 1 bis 5 beansprucht ist.

7. Reifen mit einer hohen Querkrümmung für Motorradräder

   - mit einem Karkassenaufbau (2), der aus wenigstens einer Karkassenlage (3) besteht, deren Umfangsendränder (3a) um zwei Wulstkerne (4) umgeschlagen sind,
   - mit einem sich in Umfangsrichtung um die Karkassenlage (3) erstreckenden Gurtaufbau (6) aus wenigstens einem nicht dehnbaren metallischen Kord (7) oder einem metallischen Kord (7) mit hoher Dehnung, der in einer Vielzahl von Umfangswindungen (7a) Seite an Seite entsprechend einem solchen Profil mit hoher Querkrümmung gewickelt ist,

- mit einem Laufflächenband (8), das am Umfang auf den Gurtaufbau (6) aufgebracht ist,

dadurch gekennzeichnet,

- daß der Reifen weiterhin ein behelfsweises Stützelement enthält, das in Form einer einzigen Bahn (9) aus Elastomermaterial hergestellt ist, welches Bindeeinrichtungen aufweist, die in dem Elastomermaterial homogen verteilt sind, wobei alle Windungen des wenigstens einen Kords (7) radial außen auf die Bahn (9) gewickelt sind,
- wobei die Bindeeinrichtungen dünnfädige Fasern aufweisen, um die Streckbarkeitseigenschaften des Materials zu erhöhen, ohne seine Haftfähigkeitseigenschaften während der Reifenfertigungsschritte zu ändern, wenn sich das Material in dem Rohzustand befindet.

8. Reifen nach Anspruch 7, dadurch gekennzeichnet, daß die dünnfädigen Fasern eine Aramidfasermasse aufweisen.

9. Reifen nach Anspruch 8, dadurch gekennzeichnet, daß die Aramidfasermasse in das die Bahn bildende Elastomermaterial in einer Menge eingebracht wird, die zwischen 1 und 10 phr liegt.

10. Reifen nach Anspruch 8, dadurch gekennzeichnet, daß die Aramidfasermasse kurze dünnfädige Fasern aus Poly-Para-Phenylen-Terephthalamid aufweist, die eine Länge zwischen 0,1 und 2,5 mm haben.

11. Reifen nach Anspruch 8, dadurch gekennzeichnet, daß die Aramidfasern in Umfangsrichtung des Reifens vorgerichtet sind.

Revendications

1. Procédé pour la fabrication d'un pneumatique à haute courbure transversale, en particulier pour roues de motocyclette, comprenant les étapes consistant à :

- fabriquer au préalable sur un tambour d'assemblage une structure de carcasse (2) comprenant au moins une nappe (3) de carcasse dont les bords (3a) sont retournés autour de deux tringles (4) de talon;
- agencer un élément de support auxiliaire (9) sur un tambour à peigne (10), dans une configuration cylindrique, ledit élément de support se présentant sous forme d'une feuille de matériau élastomère brut comportant des fibrilles distribuées de manière homogène dans le matériau élastomère afin d'accroître les caractéristiques d'étirement dudit matériau sans altérer sensiblement les caractéristiques d'adhésion de ce dernier enroulé autour du tambour à peigne;
- déformer le tambour à peigne (10) par l'expansion radiale d'une pluralité de secteurs (11) mobiles radialement associés au tambour à peigne (10), afin de donner à l'élément de support auxiliaire (9) un profil transversal curviligne;
- enrouler circonférentiellement autour de l'élément de support auxiliaire (9) au moins un câble métallique (7) de type inextensible ou à grand allongement, formant une pluralité de bobines circonférentielles (7a) disposées consécutivement côte-à-côte pour définir une structure de ceinture (6) de profil transversal curviligne;
- appliquer de manière circonférentielle une bande de roulement (8) à la structure de ceinture (6);
- appliquer la structure de ceinture (6) en même temps que la bande de roulement (8) à la circonférence de la structure de carcasse (2) fabriquée au préalable.

2. Procédé selon la revendication 1, caractérisé en ce que lesdites fibrilles comprennent de la pâte d'aramide.

3. Procédé selon la revendication 1, caractérisé en ce que ladite pâte d'aramide est introduite dans le matériau élastomère en une quantité allant de 1 à 10 parties en poids pour cent parties d'élastomère.

4. Procédé selon la revendication 3, caractérisé en ce que les fibres dans ladite pâte d'aramide ont une longueur allant de 0,1 à 2,5 mm.

5. Procédé selon la revendication 1, caractérisé en ce que l'élément de support auxiliaire (9) est formé par une étape de laminage, pour pré-orienter lesdites fibres d'aramide suivant une direction préférentielle dans le matériau élastomère.

6. Pneumatique pour roues de motocyclette obtenu par un procédé tel que revendiqué dans les revendications 1 à 5.

7. Pneumatique à haute courbure transversale, pour roues de motocyclette, comprenant :

- une structure de carcasse (2) constituée d'au moins une nappe (3) de carcasse dont les bords (3a) sont retournés autour de deux tringles (4) de talon;
- une structure de ceinture (6) s'étendant circonférentiellement autour de la nappe (3) de carcasse, et constituée d'au moins un câble métallique (7) de type inextensible ou à grand allongement, enroulé en une pluralité de bobines circonférentielles (7a) disposées côte-à-côte selon le profil à haute courbure transversale;
- une bande de roulement (8) appliquée de manière circonférentielle à la structure de ceinture (6);

caractérisé en ce que ledit pneumatique contient en outre un élément de support auxiliaire sous forme d'une feuille (9) de matériau élastomère comprenant un moyen de liaison distribué de manière homogène dans le matériau élastomère; toutes les bobines dudit câble (7) au nombre d'au moins un sont enroulées radialement et extérieurement sur ladite feuille (9); et

ledit moyen de liaison comprend des fibres fibrillaires pour accroître les caractéristiques d'étirement dudit matériau sans altérer sensiblement les caractéristiques d'adhésion de ce dernier pendant les étapes de fabrication du pneumatique, quand ledit matériau est à l'état brut.

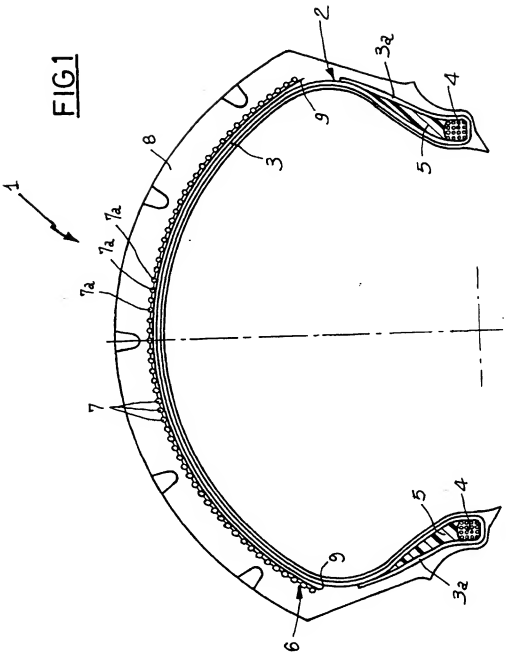
8. Pneumatique selon la revendication 7, caractérisé en ce que lesdites fibres fibrillaires comprennent de la pâte d'aramide.

9. Pneumatique selon la revendication 8, caractérisé en ce que ladite pâte d'aramide est introduite dans le matériau élastomère formant ladite feuille en une quantité allant de 1 à 10 parties en poids pour cent parties d'élastomère.

10. Pneumatique selon la revendication 8, caractérisé en ce que ladite pâte d'aramide comprend de courtes fibres fibrillaires de poly(para-phénylène téréphthalamide) ayant une longueur allant de 0,1 à 2,5 mm.

11. Pneumatique selon la revendication 8, caractérisé en ce que lesdites fibres d'aramide sont pré-orientées suivant la direction circonférentielle du pneumatique.

FIG1



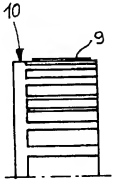


FIG 2

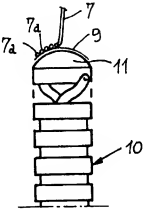


FIG 3

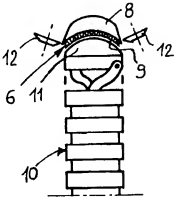


FIG 4

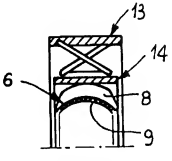


FIG 5

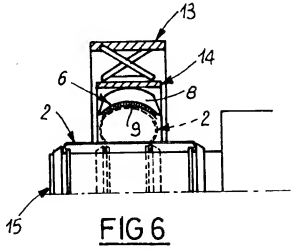


FIG 6